Framework for Modeling Technology Policy: Renewable Energy in Abu Dhabi

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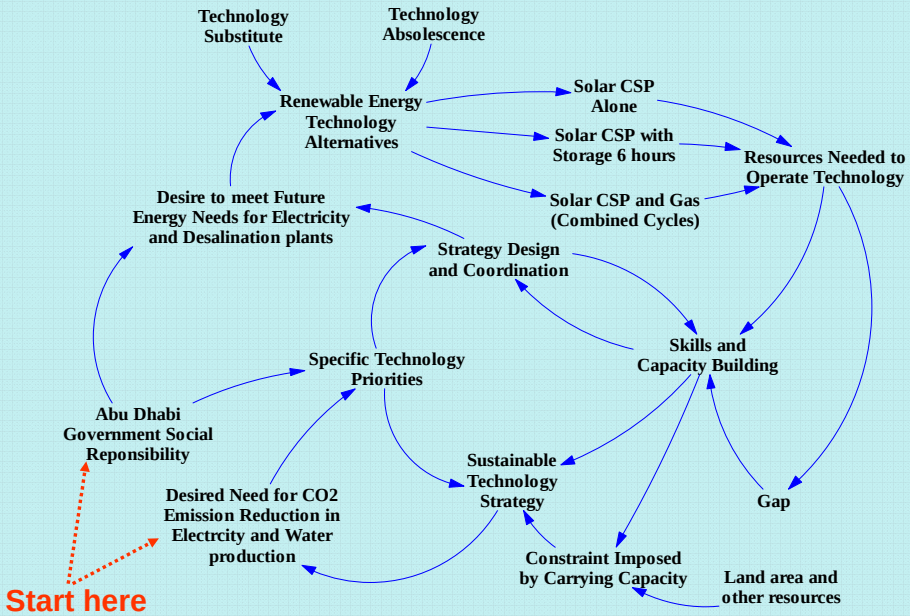
Introduction

This paper presents a framework for modeling technology policy for Abu Dhabi, an entity of the United Arab Emirates (UAE).

Challenges

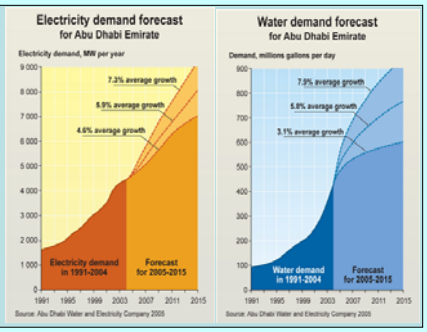
First, this case illustrates a set of countries that are energy-rich and major oil exporters, but singularly scarce in water resources and must rely on desalination.
Second, it highlights the immense challenges and complexities associated with technology policy in a critical situation, namely one in which water is available only through desalination, and desalination is predicated on energy use.
Third, it signals how the design of technology policy (and modeling scenarios) to meet national needs must take into account new priorities and strategic commitments --namely to reduce C02 emissions, support sustainable development, and emphasizing capacity building buttressed by prospects for technology development.

Mapping Technology Policy – The Logic in "Story Form"



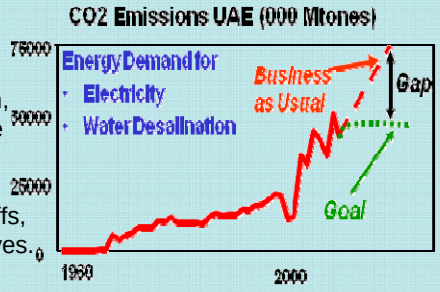
Energy and Water

Fossil fuels have been the main driver of the UAE economic growth for the past 30 years. This growth resulted in an increased population and the country experienced higher living standards due to oil revenues. This has resulted in more demand for electricity and water.



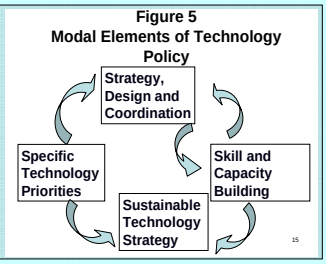
The Policy Problem

At a minimum, one of the most pressing policy problems for Abu Dhabi is to reduce the gap between (a) the expected level in CO2 emission, under business and usual conditions and (b) the desired level under a scenario that would retain current levels unchanged well into the future. This involved identifying and leveraging trade-offs, inter-temporal effects, and institutional imperatives.



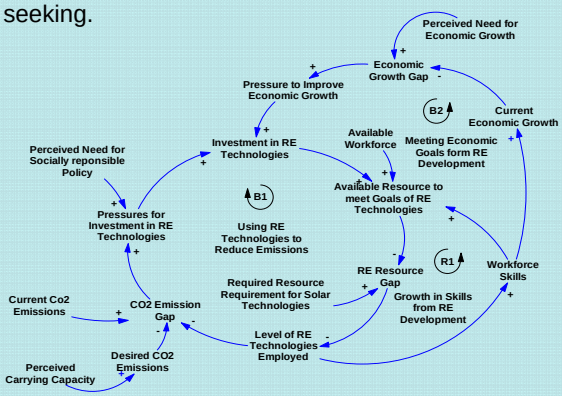
Technology Policy – High Level View

Policies may generate transitory benefits while in the long run challenges grow more difficult; outcomes are history dependant—taking one path may preclude others, and actions may be irreversible; and decisions are tightly coupled—the important sectors in the system interact with each and with the natural environment. Key policy leverages and potential impacts must be identified



The Modular Approach

In light of these complex substantive, policy, and strategic challenges, we propose to approach modeling technology policy process in *modular terms*. Cutting across all relevant elements of policy are two significant goals, namely (a) increasing the knowledge intensity of economic activity and (b) assist in positioning Abu Dhabi for long-term sustainable development. Figure below is a causal loop diagram that illustrates the dynamics of goal-seeking.



Next Steps

(1) design the initial structural features of technology policy (2) focus renewable energy for electricity generation and water desalination (3) develop the empirical data for anchoring the parameters of the model, and (4) proceed with a full specification of a system dynamics model for policy analysis.